—— **ORIGINAL ARTICLE** ——

Mental depression as a risk factor for periodontal disease: A case–control study

Zareen Fatima, Afshan Bey, S. A. Azmi[1], N. D. Gupta, Amaan Khan[2]

Department of Periodontology, Dr. Z. A. Dental College, Aligarh Muslim University, [1]Department of Psychiatry, J. N. Medical College, Aligarh Muslim University, Aligarh, [2]Career Dental College, Lucknow, Uttar Pradesh, India

Address for correspondence:
Dr. Zareen Fatima,
Department of Periodontology,
Dr. Z. A. Dental College, Aligarh Muslim
University, Aligarh, Uttar Pradesh, India.
E-mail: zareenzaibi@gmail.com

ABSTRACT

Aim: Periodontal disease is an immune-inflammatory response of tooth supporting structures to microbial dental plaque. It is influenced by various factors such as poor oral hygiene, smoking, systemic diseases, and psychological factors such as stress. This case–control study was performed to consider mental depression as a risk factor for periodontal disease. **Materials and Methods:** A total of 170 subjects were selected. All the subjects were assessed for the presence of depression by Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision criteria and severity of depression was measured by Hamilton depression rating scale. For assessment of periodontal disease, clinical periodontal parameters oral hygiene index, gingival index, probing pocket depth (PPD), and clinical attachment level (CAL) were recorded. **Results:** Univariate logistic regression analysis demonstrated that subjects with depression had significantly higher values of debris index, calculus index, gingival index, PPD, and CAL ($P < 0.001$). Periodontal status was poor in patients with severe and very severe grade depression patients ($P = 0.049$). For all the indices/parameters, mean values of patients with > 6 months of illness were higher ($P < 0.05$). **Conclusion:** Within the limits of this study, it is concluded that mental depression significantly affects the periodontium. It may be considered as risk factor for periodontal disease.

Key words
Depression, periodontal disease, risk factors, stress

INTRODUCTION

Inflammatory periodontal diseases represent a range of inflammatory disorders that affect the supporting tissue of the teeth. They arise due to complex interactions between the pathogenic bacteria and the host's inflammatory-immune response. They also depend on various factors such as poor oral hygiene, smoking, systemic diseases such as diabetes mellitus, cardiovascular diseases, and psychological factors such as stress and depression.[1] It is a fact that stress and/or depression has a significant impact on host's immune response, and on another side, it also affect a large section of the modern population. This study was conducted to increase our knowledge about the relationship between poor periodontal conditions with psychological state of the patient and to consider mental depression as underlying or contributory factor of periodontal disease.

Depression is defined as pervasive, protracted periods of despondency (low spirit), feeling of meaninglessness, and a sense of hopelessness. It is among the leading causes of ill health, loss of productivity and disability worldwide.[2]

There are many links described in the literature between depression and infectious diseases which support the possibility that these conditions may be associated with periodontal disease too.[3,4] In depression glucocorticoids released into the cortex of suprarenal can induce reduction

Access this article online	
Quick Response Code:	**Website:** www.ejgd.org
	DOI: 10.4103/2278-9626.179557

of pro-inflammatory cytokines secretion (interleukins, prostaglandins, and tumor necrosis factor) while on the other hand, catecholamines (epinephrine and norepinephrine) stimulate the formation and activity of prostaglandins and proteolytic enzymes which can indirectly provoke tissue destruction. Depression is also associated with poor oral hygiene practices, dietary changes, altered sleep patterns, and smoking which can either directly or indirectly predispose a subject to deterioration of periodontal health.

MATERIALS AND METHODS

This case–control study was conducted at the Department of Periodontology of Dr Z. A. Dental College and Hospital, Aligarh Muslim University in collaboration with Department of Psychiatry, J. N. Medical College and Hospital, Aligarh, in accordance with the World Medical Association Declaration of Helsinki and approved by the Research Ethics Committee of Faculty of Medicine, Aligarh Muslim University. A total number of 170 subjects, age- and sex-matched, were selected from J. N. Medical College and Hospital. Case group consisted of 85 subjects who reported the first time in psychiatry OPD and diagnosed as depression patients by specialist, and control group consisted of 85 mentally healthy subjects those reported along with the patients living in the same environment as of depression patients. Written consent was obtained from all patients before participating in the study.

Subjects having any complicating/confounding condition, for example, hematological, hormonal, allergic, or other chronic conditions, and subjects taking medication from past 3 months were excluded from the study. Pregnant and lactating subjects were not included in the study. Smokers were excluded from the study.

Assessment for depression

All the cases and controls were assessed for the presence of depression by Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision criteria and severity of depression was measured by Hamilton depression rating scale (HAM-D).[5] It is a rating scale consisting of 21 questions regarding symptoms and attitudes.

Periodontal assessment

Periodontal assessment was done via recording of oral hygiene index (DI and CI; Greene and vermillion, 1960), gingival index (GI; Loe and Silness, 1967), probing pocket depth (PPD), and clinical attachment level (CAL) using University of North Carolina-15 (UNC-15 probes Hu-friedy, USA) by single examiner who had been calibrated before the commencement of the study. Examiner was also kept blinded for the case and control subjects to avoid subjective biasness.

Statistical analysis

Considering confidence interval 6 and percentage 80%, minimum sample size needed was 85 per group. Data were summarized as a mean ± standard deviation. Groups were compared by one-way analysis of variance. Categorical comparisons were made using Chi-square test. For comparison of different periodontal indices, Mann–Whitney U-test and Kruskal–Wallis test were employed. The confidence level of the study was kept at 95%, hence a $P < 0.05$ indicated a significant association.

RESULTS

This study reported results from a final sample size of 170 individuals, calculated to find a difference between periodontal indices in depression patients and mentally healthy subjects. Effect of oral hygiene methods on periodontal indices was also evaluated in depression patients.

Table 1 revealed that subjects with depression had significantly higher debris index, calculus index, gingival index, PPD, and CAL as compared to healthy subjects ($P < 0.001$).

For all the parameters subjects with severe and very severe grades of depression had higher mean values as compared to those with mild and moderate grades of depression [Table 2]. However, the association was significant only for calculus index ($P = 0.049$).

According to Table 3, for all the indices/parameters, mean values of patients with > 6 months of illness were

Table 1: Periodontal indices in subjects with depression and healthy subjects

	DI	CI	GI	PPD	CAL
Subjects with depression	1.48±0.71	1.26±0.73	1.30±0.75	2.96±0.93	3.44±1.16
Healthy subjects	0.69±0.70	0.48±0.60	0.44±0.52	2.02±0.79	2.14±1.00
Mann-Whitney U-test[a]	Z=6.708; P<0.001	Z=6.785; P<0.001	Z=7.451; P<0.001	Z=6.551; P<0.001	Z=7.268; P<0.001

[a]Significance of difference. DI – Debris index, CI – Calculus index, GI – Gingival index, PPD – Probing pocket depth, CAL – Clinical attachment level, SD – Standard deviation

Table 2: Severity of depression and periodontal indices

Parameter	Mean±SD				Kruskal-Wallis test[a]	
	Mild (*n*=3)	Moderate (*n*=19)	Severe (*n*=49)	Very severe (*n*=14)	Z^2	*P*
DI	0.72±0.25	1.33±0.74	1.56±0.68	1.57±0.73	5.692	0.128
CI	0.57±0.09	0.99±0.83	1.31±0.68	1.56±0.69	7.878	0.049
GI	0.35±0.04	1.18±0.90	1.35±0.68	1.48±0.74	6.555	0.088
PPD	2.41±0.85	2.81±1.16	2.96±0.85	3.31±0.81	4.154	0.245
CAL	2.60±0.70	3.42±1.39	3.37±1.04	3.87±1.24	3.072	0.381

[a]Significance of difference. DI – Debris index, CI – Calculus index, GI – Gingival index, PPD – Probing pocket depth, CAL – Clinical attachment level, SD – Standard deviation

higher as compared to those with <6 months of illness. The difference between two categories of patients was observed to be statistically significant too ($P < 0.05$) for all the parameters except calculus index ($P = 0.076$).

Table 4 revealed that mean debris index and calculus index were higher in patients using finger or abrasive power as compared to those using other means of oral hygiene maintenance. Statistically, the association was significant too ($P < 0.05$). Mean gingival index of patients using miswak (plant twig) and brush were lower as compared to other means of oral hygiene maintenance, and the association was also statistically significant ($P = 0.050$). Although mean PPD of patients using abrasive powder and brush was lower as compared to those using other means of oral hygiene maintenance, yet the association was not statistically significant ($P = 0.211$). Mean CAL was lower among those using brush as compared to those using other means for the maintenance of oral hygiene, but the association was not statistically significant ($P = 0.433$).

DISCUSSION

The contribution of psychological factors to the development and progression of periodontal disease has recently become an area of increased research activity as depressive disorders constitute one of the major mental health problems. The report on Global Burden of Disease estimated that by the year 2020 if current trends for demographic and epidemiological transition continue, the burden of depression will increase to 5.7% of the total burden of disease and it would be the second leading cause of disability-adjusted life years,

second only to ischemic heart disease.[6] In view of the morbidity, depression as a disorder has always been a focus of attention of researchers. But now, it is time to bring awareness also toward the depression as a risk factor for periodontal diseases.

As most of the previous studies[7,8] did not report any strong associations between depression and periodontal diseases, in this study sample selection was done with caution like periodontal status was examined in patients with confirmed diagnosis of mental depression and the proper instruments of psychological analysis. Effect of oral hygiene measures on periodontal indices among depression patients was also evaluated. The HAM-D scale, which was used in the study, is a multidimensional scale and easy to use. Validity of the HAM-D has been reported to range from 0.65 to 0.90 with global measures of depression severity.[9] Only questionnaires were used in the study as there are no biological markers available for confirmed diagnosis of depression.[10] Various past studies have also reported contradictory results of using different biological markers of stress/depression. By contrast, questionnaires can be routinely used by dentists as a means of collecting information about a patient's depression level in noninvasive way.[11]

Results in Table 1 were similar to the previous studies[12,13] which demonstrated that subjects with a diagnosis of depression had a more dental plaque and gingival inflammation, and more deep pockets than that of healthy controls. It has also been reported that there was trend in patients with severe periodontal disease having more depression than patients with mild/moderate disease and healthy controls.[14] These results also support findings in Table 2 but in indirect way.

The duration of depression was assessed only on basis of the history given by patient [Table 3]. Possible fluctuation of depressive symptom levels over time together with the slow progression of periodontal disease may set additional requirements for the study design and methods. Longitudinal studies are still needed to further clarify the relationship between duration of depression and poor periodontal state.

Results in Table 4 demonstrated that there was a significant association between debris/calculus index

Table 3: Duration of depression and periodontal indices

Parameter	Mean±SD		Mann-Whitney U-test[a]	
	>6 months (*n*=49)	<6 months (*n*=36)	Z^2	*P*
DI	1.64±0.63	1.26±0.75	2.607	0.009
CI	1.39±0.75	1.07±0.68	1.775	0.076
GI	1.45±0.74	1.10±0.73	2.105	0.035
PPD	3.19±0.98	2.65±0.76	2.415	0.016
CAL	3.73±1.20	3.04±0.97	2.602	0.009

[a]Significance of difference, DI – Debris index, CI – Calculus index, GI – Gingival index, PPD – Probing pocket depth, CAL – Clinical attachment level, SD – Standard deviation

Table 4: Depression, oral hygiene measures and periodontal indices

Parameters	Mean±SD					Kruskal-Wallis testa	
	None	Finger	Miswak (plant twig)	Abrasive powder	Brush	Z^2	*P*
DI	1.53±1.00	1.97±0.58	1.79±1.12	2.17±0.14	1.30±0.64	16.696	0.002
CI	1.51±0.56	1.75±0.52	1.23±1.09	2.03±0.60	1.06±0.71	15.866	0.003
GI	1.58±0.46	1.65±0.67	1.19±1.15	1.98±0.12	1.15±0.76	9.511	0.050
PPD	3.29±0.79	3.35±0.85	3.54±1.59	2.83±0.66	2.82±0.93	5.842	0.211
CAL	3.61±1.20	3.70±1.00	3.92±1.65	4.13±1.19	3.30±1.19	3.803	0.433

[a]Significance of difference. DI – Debris index, CI – Calculus index, GI – Gingival index, PPD – Probing pocket depth, CAL – Clinical attachment level, SD – Standard deviation

and patients using finger or abrasive powder. Mean gingival index of patients using miswak (plant twig) and brush were lower as compared to other means of oral hygiene maintenance. Lack of motivation, improper way of brushing, and irregular oral self-care practices in patients with depression support this result. Poor oral hygiene might be the strongest reason for worse periodontal conditions in depression patients.

CONCLUSION

Patients with depression may experience difficulties in initiating dental checkups and in its maintenance. A more active approach from dentists may be needed, maintenance care intervals should be shorter, and the patients should also be informed that their psychological problems may affect their immune status negatively, and thus it is important for them to keep regular routines for oral hygiene. It is also very important that along with medical history, we should also assess the psychological state of patients. Validated questionnaires designed to assist a dental care professional in the determination of a patient's mental condition would be useful for the management of periodontal diseases in routine dental or periodontal practices.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Genco RJ. Current view of risk factors for periodontal diseases. J Periodontol 1996;67 10 Suppl: 1041-9.
2. Malhi GS, Bartlett JR. Depression: A role for neurosurgery? Br J Neurosurg 2000;14:415-22.
3. Warren KR, Postolache TT, Groer ME, Pinjari O, Kelly DL, Reynolds MA. Role of chronic stress and depression in periodontal diseases. Periodontol 2000 2014;64:127-38.
4. Khambaty T, Stewart JC. Associations of depressive and anxiety disorders with periodontal disease prevalence in young adults: Analysis of 1999-2004 National Health and Nutrition Examination Survey (NHANES) data. Ann Behav Med 2013;45:393-7.
5. Hamilton M. Rating depressive patients. J Clin Psychiatry 1980;41(12 Pt 2):21-4.
6. Murray CJ, Lopez AD. Global mortality, disability, and the contribution of risk factors: Global burden of disease study. Lancet 1997;349:1436-42.
7. Vettore MV, Leão AT, Monteiro Da Silva AM, Quintanilha RS, Lamarca GA. The relationship of stress and anxiety with chronic periodontitis. J Clin Periodontol 2003;30:394-402.
8. Solis AC. Association of Periodontal Disease to Anxiety and Depression Symptoms, and Psychosocial Stress Factors. Thesis, Masters in Periodontics, Faculty de Odontologia, University of Sao Paulo, Sao Paulo; 2002.
9. Hamilton M. Hamilton rating scale for depression (Ham-D). In: John Rush A, editor. Handbook of Psychiatric Measures. 2nd ed. Washington, DC: APA; 2000. p. 526-8.
10. Menezes PR, Nascimento AF. Validity and reliability of the scales in Psychiatry. Scales of clinical assessment in Psychiatry and Psychopharmacology 2000;2:23-8.
11. Croucher R, Marcenes WS, Torres MC, Hughes F, Sheiham A. The relationship between life-events and periodontitis. A case-control study. J Clin Periodontol 1997;24:39-43.
12. Castro GD, Oppermann RV, Haas AN, Winter R, Alchieri JC. Association between psychosocial factors and periodontitis: A case-control study. J Clin Periodontol 2006;33:109-14.
13. Saletu A, Pirker-Frühauf H, Saletu F, Linzmayer L, Anderer P, Matejka M. Controlled clinical and psychometric studies on the relation between periodontitis and depressive mood. J Clin Periodontol 2005;32:1219-25.
14. Safa S, Glogauer M. Development and Preliminary Analysis of a Questionnaire to Study Links between Stress, Social Support and Periodontal Disease. [Thesis] Toronto, Ontario: University of Toronto, Faculty of Dentistry; 2007.